CH 1 / What Makes a DSLR Camera?
A straightforward overview of the features that characterise DSLRs and how they affect your photography.

CH 3 / Lenses: The Heart of a System
Explore the key features of interchangeable lenses and the roles of lenses in a DSLR system.

CH 5 / Taking Control
Learn how to adjust exposures to produce perfectly exposed photos.

CH 7 / Focusing and Depth of Field
Take control over what is and isn’t sharp in your photos.

CH 9 / Why Shoot Raw?
Find out how to use the raw file format in your camera to obtain the highest image quality.

CH 2 / Buying Guide
Factors to consider when planning to buy a DSLR camera.

CH 4 / Basic Camera Settings
A guide to the main camera controls and how to use them.

CH 6 / Sensitivity and Colour Controls
Understand two camera functions that can make a real difference to the way your digital photos look.

CH 8 / Shooting in Live View Mode
Discover how to use the camera’s monitor effectively for shooting stills and movies.

CH 10 / Editing and Sharing Photos
Explore some simple procedures for enhancing and sharing images.
Why buy a digital SLR (DSLR) camera when most people are using smartphone cameras to produce photos for posting on social networks? If this is where most of your pictures end up, a smartphone can be a pragmatic choice.

But, for the important events in your life, smartphone snapshots simply don’t cut it. Once-in-a-lifetime holidays should be recorded with versatile and capable equipment. The same is true for landmark family occasions or gatherings of friends. Shoot some portraits; aim to record movies with a professional ‘look’ or try techniques that are a bit out of the ordinary and differences are revealed.

If you’d like to become involved in creative photography, a DSLR is unquestionably the best tool. It will provide the greatest flexibility for capturing all kinds of subjects – plus the best image quality in any situation.

If you’re moving up from a compact digicam to a DSLR, you’ll gain the following benefits:

- Superior overall performance, particularly in dim lighting and at high ISO settings.
- Plenty of user-adjustable controls and a wider range of adjustable settings to control how images are recorded and provide scope for creativity.
- Interchangeable lenses to cover a wide range of focal lengths, including macro and telephoto lenses.

• A decent viewfinder that can be used in all types of lighting and lets you confirm immediately whether shots are in focus and if the lighting is correct.
They also have a few disadvantages worth keeping in mind.

- The camera body is larger and heavier.
- Lenses may be bulky and heavy so you have to carry more weight.
- Changing lenses takes time (and shots can be missed).
- During an exposure, the viewfinder is blocked momentarily.
- Camera operating sounds may be recorded in movie soundtracks.

When you shoot in low light, attempt to capture action at an indoor sporting event, try extreme close-ups or wildlife photography or when you want to control background blurring and isolate the subject, a DSLR is the best tool to use. It won’t fit into your pocket like a digicam or smart-phone but it’s more capable and versatile and will deliver the best quality for your buck.

If you already own a DSLR that’s a couple of years old, you may be thinking of updating.

Prices for entry-level DSLRs have come down lately and they’re often cheaper than some fixed lens models. More up-market models are also cheaper than in the past and provide higher resolution, newer processors and innovative functions to help you take better pictures. So there are plenty of incentives to upgrade.

Deciding which DSLR equipment to buy can be difficult because there are so many choices to make. And you need to understand the new technologies.

This pocket guide explains how to select equipment that will meet your needs and how to use it effectively. It’s written in non-technical language and presents the information in a way that is easy to understand.

When choosing a camera, consider are the types of pictures you wish to take. Will the camera be used mainly for photographing children’s sports, family get-togethers and holidays? Or will you be using it creatively for photographing landscapes, wildlife, street scenes or other non-personal subjects? The first two chapters can help you answer these questions.

The remaining chapters will cover issues associated with using your camera creatively, including tips on lenses, using different camera settings, focusing and colour controls. We’ll also take an in-depth look at raw file capture and shooting movies with a DSLR and finish up by examining ways to edit and share photos.

The Photo Review website (www.photoreview.com.au) publishes reviews of the latest imaging equipment, along with news updates and tips on buying and using digital cameras. You can also locate Australian retailers that offer good deals on equipment purchases and have knowledgeable staff to help you make the right buying decisions.
When to Upgrade

If you already own a DSLR camera, deciding when to upgrade and what type of camera to upgrade to can be challenging. The following suggestions will help you to make a wise decision:

1. A new camera won’t make you a better photographer unless it provides functions you don’t already have.

2. If you’re already shooting with a 12-16 megapixel camera and capturing raw files, you won’t require more resolution to make big prints using typical desktop equipment.

3. If you want more pixels for cropping flexibility, the downside is that you’re discarding resolution by cropping. And more pixels means smaller pixels on a given sensor size, with the associated issues at high sensitivity settings.

Nevertheless, if your current camera is several years old changing up may be inevitable. Certain camera components can ‘wear out’ and fail over time. In addition, with each generation, image processors become more capable of producing low noise at high ISO settings and managing fast burst speeds.

If you have money to invest, it can be worthwhile upgrading to a larger sensor or newer processor. But check the camera specifications carefully as the same processor chip can span several generations of cameras.
CHAPTER 1

DSLR Camera Overview

Four manufacturers dominate the DSLR market: Canon, Nikon, Pentax and Sony (which purchased Minolta’s intellectual property and retains the same lens mount). Of the minor market players, Olympus is committed to maintaining its Four-Thirds system (currently represented by the E-5), which uses smaller sensors than the other manufacturers but has been ‘designed for digital’. Leica and Sigma each market a single model plus a relatively small collection of lenses.

In this chapter we’ll investigate the most important feature camera buyers should consider: the size and resolution of the camera’s sensor. We’ll also look at the different types of cameras available for buyers to choose from, concentrating on the major manufacturers and explaining how different camera types suit different categories of users.

Sensors

Large sensors are a major reason why most photographers choose DSLR cameras and, although other camera types have begun adopting this advantage, it remains a feature you can guarantee when you buy a DSLR. Because sensors are expensive to manufacture they make a significant contribution to the overall price of a camera and account in part for differences in pricing between cameras with different sized sensors.

The CMOS sensor chip from a professional DSLR camera. (Source: Canon.)

Most DSLRs fit into one of two classes, based on sensor size. For convenience, we’ll use Nikon’s nomenclature: FX for cameras with 36 x 24 mm sensors (the same area as a 35mm film frame) and DX for APS-C sized sensors, which have an area of approximately 23.5 x 15.7 mm. There’s a third class, built around a Four-Thirds (4/3) format sensor (which measures 17.3 x 13.0 mm) but Olympus is the only company to offer a camera with this type of sensor.
Of the major manufacturers, only Canon, Nikon and Sony offered cameras with FX sensors when we went to press. Pentax produces professional medium-format cameras with even larger sensors but its DSLR offerings concentrate upon DX. Among the minor market players, Olympus is committed to maintaining its Four-Thirds system, which is currently represented by the E-5. Although it uses smaller sensors than the other manufacturers, the camera body – and, more importantly, its lenses – have been ‘designed for digital’ ever since the system was launched in 2002.

Until recently, most FX cameras have been built for professional photographers and priced accordingly. However, 2012 has seen the arrival of entry-level FX-format DSLRs that compete in price with high-end enthusiasts’ cameras.

Most entry-level and enthusiast cameras have DX sensors, which range in size from approximately 23.5 x 15.6 mm to 22.3 x 14.9 mm. Relative to digicams and smart-phones, the sensors in these cameras are still large; but they’re not as big as full frame sensors.

The diagram above shows the different sensor sizes available in today’s DSLR cameras.
How many megapixels do you need?

A lot of the heat has gone out of the ‘megapixel wars’ that have dominated the camera market from the beginning. And most camera buyers have come to realise there’s a point, beyond which paying for pixels you don’t need is a waste of money. It’s better to invest in a camera with a better quality lens, larger sensor and more effective image processor.

However, a lingering feeling that more pixels can be advantageous still drives camera development and, until consumers begin clamouring for larger pixels, rather than more pixels, it’s likely to hang around.

So, how many pixels do you actually need in your DSLR’s sensor?

It largely depends on how big you want to print your pictures and how much you are likely to crop images after you’ve taken them. More megapixels means more detail is recorded and, consequently, you can make larger prints or apply more savage cropping.

If you base your choice on the first criterion, it’s unlikely you will need more than 18 megapixel resolution from your camera. The diagram below shows the optimal sensor resolution for three popular print sizes at the standard print resolution of 300 dots per inch (dpi).

Because larger prints are viewed from greater distances, resolution requirements go down as you increase print size, so there is little difference between, say, an 16-megapixel sensor and a 20-megapixel sensor. It is possible to make excellent A3 (and A3+) prints from 8- or 10-megapixel DSLR cameras and A2-sized prints from 12-megapixel or higher cameras.

Some portrait photographers invest heavily in cameras with high-resolution sensors to capture more pixels for portraits. They then spend hours in...
post-production cloning out blemishes that may not have been picked up had the sensor’s resolution been lower. It’s actually possible to have higher resolution that you need – or can use. More pixels often means more post-processing to remove details in photos that you’d rather not have.

As a test, take one of your best images, reduce it to 1920 x 1080 pixels to match Full HD screen resolution and display it on your widescreen TV set. While a close examination of the screen may reveal individual pixels (provided the screen is sharp enough), you’ll find what is effectively a two megapixel image looks just great at the correct viewing distance.

If the ability to zoom in by cropping plays an important role in your photography, you should think about the reasons you crop: do you lack a suitable telephoto lens or are you just reluctant to move closer to subjects? Your answer should reveal how you can minimise the need to crop – which is desirable if you want the best image quality your camera can deliver.

Each time an image is cropped, pixels are removed and overall resolution is reduced. It doesn’t make sense to pay for pixels you’re in the habit of throwing away.

Moving closer to the subject to make it fill the image frame is better than zooming in by cropping shots because it preserves the full image resolution.
Why Sensor Size Matters

The larger the image sensor with respect to the number of ‘pixels’ it produces, the higher its potential light-capturing ability. More light gives the camera’s image processing system more information to work with. Consequently, the camera can record a wider range of tones and reproduce colours more accurately than a compact digicam. It will also produce sharper and less grainy-looking pictures in dim lighting.

It’s quite easy to calculate the approximate pixel size for any camera’s sensor. Simply divide the length of the longest side of the sensor by number of pixels in the longest dimension of the highest-resolution image. (This calculation works just as well when the shorter sides of the image and sensor are used.) The table below compares pixel size for the three DSLR sensor formats and a typical digicam sensor on the basis of 18-megapixel output resolution (which produces images 5184 pixels wide).

Larger sensors require larger camera bodies to accommodate them – and also larger lenses. While this might not matter much for professional photographers who work in studios, it can make a huge difference in the amount of gear you carry when you travel. If you’re keen on wildlife photography or enjoy hiking or bushwalking, you’ll need to think carefully before investing in a full frame system.

Although other cameras may offer the same megapixel resolution as a DSLR camera, the individual light-capturing photosites on a DSLR’s sensor are usually four to six times larger than those in a compact digicam’s sensor. It’s worth paying more for a larger sensor when you need superior performance in low light levels and with long telephoto lenses.

Image Processors

The image processor in a DSLR is used to convert the raw data from the image sensor into a colour-corrected image. Typically, a processor consists of a silicon chip plus the software that drives it. Each manufacturer has its own brand name for its image processor. Canon uses

<table>
<thead>
<tr>
<th></th>
<th>FX</th>
<th>DX</th>
<th>4/3 System</th>
<th>Digicam</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pixel dimensions</strong></td>
<td>5184 x 3456 pixels</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sensor dimensions</strong></td>
<td>36 x 24 mm</td>
<td>23.5 x 15.6 mm</td>
<td>17.3 x 13.0 mm</td>
<td>7.6 x 5.7 mm</td>
</tr>
<tr>
<td><strong>Pixel size</strong></td>
<td>6.9 microns</td>
<td>4.5 microns</td>
<td>3.3 microns</td>
<td>1.5 microns</td>
</tr>
</tbody>
</table>

Most manufacturers update their processor chips periodically, introducing new algorithms that are better able to calculate processing parameters. Some add extra chips that enable cameras to handle image data faster and/or use more sophisticated processing algorithms.

Professional DSLRs often have several processors devoted to image processing plus additional chips that handle focusing and metering. They increase the price of these cameras – but also their capabilities and performance.

As sensor technology progresses, the technology for interpreting the data (image processing) will also advance. While future cameras will have more efficient sensors, processors are likely to keep pace – or even out-class sensor developments.

New processors have also introduced functions like noise reduction, edge enhancement, dynamic range adjustment; not to mention a raft of in-camera special effects.

Each new generation of processors will almost invariably improve imaging performance, particularly with respect to processing speeds and minimising the effects of noise in shots taken at low light levels. They can also provide
worthwhile improvements to video performance.

It’s worth paying attention to the image processor when buying a new camera and you can benefit from having the latest processor, even though the camera may cost a little more.

**Market Differentiation**

The DSLR market splits into three main categories, each catering for a different level of expertise (and preparedness to invest in equipment). Professional photographers require ‘workhorse’ cameras that are ruggedly built and will keep operating in all kinds of conditions.

Consumers prefer smaller cameras and rarely subject them to the workload a pro camera routinely handles. Size, weight and price are usually the key factors underpinning camera choice.

In between these extremes are photo enthusiasts, who want good gear but can’t justify paying several thousands of dollars for it. They also tend to want cameras that are lighter than pro models but still provide many professional features.

Factors influencing camera choice in each group include build materials, components and quality control during manufacture. The table on next page compares the main differences between professional, enthusiast and consumer DSLRs.

![Camera](image)

**Pentax’s K-30** is unusual for a consumer DSLR because it has a weather-resistant body, a feature usually only found on high-end cameras. (Source: Pentax.)

![Camera](image)

**Cameras designed for serious photo enthusiasts** will accept professional-quality lenses, which makes them a useful upgrade path for aspiring pro photographers.
<table>
<thead>
<tr>
<th></th>
<th>Professional DSLRs</th>
<th>Enthusiast DSLRs</th>
<th>Entry-level DSLRs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cost</strong></td>
<td>High (usually more than $2500 for a body)</td>
<td>Moderate to high ($1500 to $2400)</td>
<td>Low ($1400 and below)</td>
</tr>
<tr>
<td><strong>Body materials</strong></td>
<td>Mainly metal, usually weatherproof</td>
<td>Metal and plastic, sometimes spray and dust resistant</td>
<td>Mainly plastic, not weatherproof</td>
</tr>
<tr>
<td><strong>Sensor size</strong></td>
<td>Usually full frame (FX)</td>
<td>Usually APS-C (DX) with some full frame</td>
<td>Always APS-C (DX)</td>
</tr>
<tr>
<td><strong>Image processor</strong></td>
<td>May have several with separate processors for metering and AF</td>
<td>Usually no more than two chips</td>
<td>One processor handles everything</td>
</tr>
<tr>
<td><strong>Shutter durability rating</strong></td>
<td>200,000 to 400,000 cycles</td>
<td>100,000 to 150,000 cycles</td>
<td>Not rated</td>
</tr>
<tr>
<td><strong>AF system</strong></td>
<td>Complex with multiple cross-type points</td>
<td>Usually 9-20 cross-type points</td>
<td>Few cross-type points</td>
</tr>
<tr>
<td><strong>Shooting modes</strong></td>
<td>P, A, S and M only</td>
<td>May include Auto and scene pre-sets</td>
<td>Always includes Auto and scene pre-sets</td>
</tr>
<tr>
<td><strong>Flash</strong></td>
<td>External only</td>
<td>Usually built-in</td>
<td>Built-in</td>
</tr>
<tr>
<td><strong>In-camera effects</strong></td>
<td>Rare</td>
<td>Sometimes</td>
<td>Usual</td>
</tr>
</tbody>
</table>

You’ll notice resolution is not included in the above table. While it’s important to have enough resolution for a particular output size, as mentioned, the take-away message is that a camera’s megapixel count is no longer the main gauge of its ability to produce high-quality images; the size and light-capturing ability of the pixels themselves is more important. So is the ability of the photographer to operate the camera. Chapters 2 and 3 provide more information on this topic.

**USEFUL URLs**

The following websites provide additional information on the topics covered in this chapter.

- [http://www.kenrockwell.com/tech/mpmyth.htm](http://www.kenrockwell.com/tech/mpmyth.htm) on why small differences in megapixel count are unimportant.